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ABSTRACT

This publication addresses issues involved in universal design for learning as they relate to full access to the general education curriculum for students with disabilities. It begins by discussing curriculum access and student engagement according to the federal mandates, which require students with disabilities to be given the opportunity to participate in the general education curriculum. Universal design for learning is described as providing flexible curricula materials and activities that offer alternatives for students with disparities in abilities and backgrounds. Charts illustrate how universal design for products and environments differs from universal design for learning, with its three essential curriculum qualities (representation, expression, and engagement). The publication closes with suggested first steps in implementing universal design for learning. An appendix provides a framework that summarizes the salient principles of universal design in a practical context to help teachers and other interested individuals consider how the tools employed in the classroom can realistically provide broader access to the curriculum for all students. It describes alternatives that reduce perceptual barriers, cognitive barriers, motor and cognitive barriers to expression, and describes alternative ways of encouraging engagement in the learning environment. (CR)

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ERIC/OSEP TOPICAL BRIEF

Fall 1998

A Curriculum Every Student Can Use: Design Principles for Student Access

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Preface

This publication is the first to come out of a project begun in the fall of 1997 and designed to address the issues involved in universal design as they relate to full access (cognitive, as well as sensorimotor) to the general education curriculum for students with disabilities. This activity is a collaborative effort funded by the U.S. Office of Special Education Programs through the ERIC/OSEP Special Project and the National Center to Improve the Tools of Educators (NCITE), with the partnership of the Center for Applied Special Technology (CAST).

The impetus for this collaborative effort comes from a convergence of the growing interest in the applications of universal design principles in various instructional media and the requirements of the IDEA Amendments of 1997 stating that students with disabilities must be given the opportunity to be involved in and progress in the same general curriculum taught to all other students in the public educational system. Providing for the special needs of students with disabilities, particularly in regard to their individualized education programs (IEPs), now includes explicit consideration for how technology can meet their needs. However, in order for their involvement to be meaningful, and for the expectation of progress to be realistic, the curriculum must be made accessible to the students. In light of the IDEA requirements and their implications, it seems particularly timely to examine what curriculum accessibility means for students with various types of disabilities and, then, how the concept of universal design, which has as its underlying goal accessibility for all, might be used to design instructional materials in all media that provide meaningful accessibility and involvement for students, regardless of their ability levels.

The first phase of the project was a stakeholder conference held in November 1997 to examine the topic by bringing together representatives of the major educational associations and their practitioner members; material developers and publishers; and researchers in universal design and curriculum issues. Representatives of the following organizations participated in that meeting: OSEP, CEC, NCITE, CAST, NEA, AFT, NAESP, NASSP, NASBE, RESNA,[1] the TRACE Center, Scholastic Inc., Microsoft, Software Publishers' Association, Skillsbank, and Houghton-Mifflin. In addition, researchers and other faculty from the following universities participated: Gallaudet, Oregon, Tufts, George Mason, Saginaw Valley State University, and UC-Riverside.

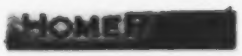
At that meeting and at follow-up meetings with CEC, OSEP, NCITE, and CAST, it became clear that a variety of efforts need to be made at all levels affecting curricular issues — political and professional — to broaden our awareness of the issues in question and deepen our understanding of the ways in which curricula must be designed, developed, and taught in order to achieve meaningful cognitive access and engagement for students at all ability levels. This publication repre-

1. OSEP — Office of Special Education Programs, Department of Education
   CEC — Council for Exceptional Children
   NEA — National Education Association
   AFT — American Federation of Teachers
   NAESP — National Association of Elementary School Principals
   NASSP — National Association of Secondary School Principals
   NASBE — National Association of State Boards of Education
   RESNA — Rehabilitation Engineering & Assistive Technology Society of North America

sents the first step in one of those efforts — a series of brief publications intended to increase awareness and understanding of the subject, to encourage dialogue within the field on these matters, and to lead, eventually, to a set of principles that developers can use in designing and creating instructional materials and media, and a set of principles that teachers and administrators at all levels can use in selecting, adopting, and using instructional materials and media.

It is important to realize that even though these groups are working to increase the awareness of universal design principles for curriculum development, the concepts are being implemented by developers and practitioners throughout the country. Textbooks with built-in flexibility and software with multiple means of representation are being used in classrooms right now. And a review of the Texas Education Agency's short- and long-range plans for the use of technology demonstrates a real commitment to curriculum access for all students regardless of disability. The means to realize the continued accessibility of the general education curriculum will result from coordinated partnerships with institutions of higher education, professional organizations, suppliers of technology-based educational products, and providers of technical assistance. With the accessibility requirements generated by the reauthorized IDEA, and the President's and Secretary of Education's commitment to computers as a teaching tool, state and local departments of education will be turning more and more to technology-based solutions.

To a large extent, the material in this publication is based on the report of the Developer Working Group on Universal Design of Curriculum, written by David Rose of CAST, and on material produced by Doug Carnine of NCITE. We are extremely grateful for their active involvement in this project, without which it would not be possible, and for their constructive and helpful reviews of the many draft versions of this topical brief.



The symbol to the left appears in the margins throughout this brief and indicates related and interesting information that can be found on the World Wide Web. You can access these sites by entering the cited URLs in your browser software. Readers without Internet access can contact the referenced organizations for information through the addresses and phone numbers under *For Further Information* in the references at the end of the brief.

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Teaching to Each Student's Strengths

Each student, regardless of disability, difference, or diversity, needs access to the curriculum that is meaningful *and that allows the student to use his or her strengths.*

In every classroom there is a large number of students who, to a greater or lesser degree, are not "getting" the curriculum. This group is not limited only to those students who have been identified as having disabilities and who are provided with IEPs, but it also includes those who are linguistically or culturally diverse, those who may be low achievers, and an amorphous number of unidentified students who may understand some of the subject matter but not enough to become competent in it. The exact number of students in this group may be a impossible to determine, but these students are there nonetheless, and they need to learn. As classrooms continue to become more inclusive and more diverse, the number of students needing special attention increases, as do the pressures on their teachers to provide for their needs. When you add to the demands of the inclusive classroom the requirement for *every* student to have an opportunity to be involved in and progress in the general education curriculum (per the 1997 Amendments to the Individuals with Disabilities Education Act [IDEA]) and the need for students to meet state testing standards, you have an unenviable but fairly typical picture of an American classroom in the late nineties. This is the reality that confronts both special and general educators and the dynamics with which they have to work.

If in such a classroom a teacher has a standard, one-size-fits-all-learning-levels textbook as the tool with which to teach the curriculum to every student, he or she has an enormous task just to get through the lesson. It's no wonder that even though teachers recognize the pressing need to adapt their instruction, they have little time to implement or even plan the adaptations. As one research study revealed, "teachers' planning considered the class as a whole and rarely, if ever, addressed the needs of specific individuals in the class, including the students who were mainstreamed." (Vaughn & Schumm, 1994)

Imagine, then, a curriculum that has been designed considering the needs of a diverse classroom, a curriculum that has built-in means for the teacher to present the subject matter so that each student can have meaningful access to it using his or her abilities and strengths, without first having to overcome the usual physical, affective, or cognitive barriers or without having to be stigmatized or isolated from the other students. If a student has physical, sensory, or cognitive disabilities, she will still be able to learn some or all of the same lesson as the other students.

From the teacher's point of view, having materials with built-in accommodations would save an incredible amount of time and energy. When adaptations or accommodations are not provided to teachers, they are left with the options of either creating all the accommodations themselves, an unrealistic expectation, or experiencing much more difficulty in teaching students who have problems in using and/or comprehending the curriculum.

For students with disabilities, an inability to interact with the curriculum can be the first stumbling block on the path toward competence.

Although planning for diversity is not a new concept in education, what is new is the focus on digital technology and other resources of curriculum designers that build that planning into the materials. This publication introduces the concept of universal design for learning to general and special educators and outlines how this growing trend can change the way teachers are able to reach all students in the inclusive classroom.

Curriculum Access and Student Engagement

What Does Access to the Curriculum Mean?

For any student to learn and progress in the subject matter taught in school, he or she must first have access to the curriculum.

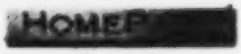
That seems to be a fairly obvious statement, but it is definitely more complicated than it appears. What exactly is meant by *access to the curriculum*? Does it mean that every student has a textbook? Or does it mean perhaps that every student has a textbook that he or she can read? And then, what is "a textbook he or she can read?" What if, for instance, the reading level of a textbook has been "averaged," as some are? Even though the textbook can be read by the majority of students in that class, what about the many students who fall below the average of the reading levels represented in the text and who can't really grasp the content or who fall behind because of reading problems? Do these students have access to the curriculum? These are important, practical questions that complicate the issue of access.

Access to the curriculum begins with a student being able to interact with it to learn. For students without disabilities, this sort of accessibility is generally not a problem, although some students have more difficulty than others. For students with disabilities, an inability to interact with the curriculum, because of physical, sensory, or cognitive barriers, can be the first stumbling block on the path toward the goal of competence. In order for these students to under-

stand and learn, the curriculum must be delivered with an array of supports for the student. The barriers to access must be removed, but, importantly, the curriculum has to continue to challenge them.

Ideally, a curriculum should be able to be modified or customized to meet the needs of both teacher and student. This includes accommodations for sensory impairments, such as Braille and captioning, and alternative "texts" such as software or adapted versions of textbooks that address disabilities in cognitive functioning. The supports and challenges must be embedded in learning activities and the activities must motivate the learner. In addition to accessing the curriculum, the student has to *engage* it in order to learn.

Federal Mandates



To view the official text of the IDEA Amendments at the Homepage of the Department of Education's Office of Special Education and Rehabilitation Services, type the following URL in your Internet browser:

http://www.ed.gov/offices/OSERS/IDEA

The IDEA Amendments of 1997 require that students with disabilities be given the opportunity to participate in the same general curriculum taught to all other students in the public educational system. This requirement has significant implications for the practice of special education, particularly as it relates to the IEP, which now must include:

- a statement of how the child's disability affects his/her involvement and progress in the general curriculum;
- a statement of measurable annual goals for enabling the child to be involved in and progress in the general curriculum;
- a statement of the education, services, program modifications and supports necessary for the child to be involved in and progress in the general curriculum, including whether the child requires assistive technology devices and services.

Thus, curriculum access for all students, regardless of their disabilities, is not merely a trend in the field of special education but a requirement of the law governing all public schools. The general education teacher will now play a much more active role in the IEP process.

Materials Design

The foundation of curriculum access for all students is the design of educational materials, the primary tools used to teach curricular content. For instance, how can textbooks and other instructional materials in any medium meet the learning needs of students with or without disabilities? Can they be readily adapted to accommo-

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date the instructional needs of the many diverse learners in any classroom? The greater the flexibility built into the materials, the greater the number of students who can be reached with a single curriculum. An important question to ask is how teachers can obtain curricular materials that allow them to customize challenges and supports for students so they will receive *just as much help as they need*. This designed-in flexibility of use is the premise of universal design for learning.

What is "Universal Design" for Curriculum Access?

Some Background on Universal Design

The concept of universal design originated in architectural studies, where considerations of physical access for individuals with sensorimotor disabilities led to designs that incorporated assistive technologies and adaptations (curb cuts and automatic doors are two common examples of such architectural adaptations). One essential quality of universal design of physical space is that the accommodations are built in rather than added as an afterthought — picture the difference between a building in which the wheelchair ramp is designed as an essential part of the entrance and a building in which an added access ramp has to snake awkwardly around the steps. What makes the design "universal" is that the adaptations are not only allow access to those who have disabilities but they make it easier for *everyone* to use the space — the ramp allows people to easily enter the building when using a wheelchair or when pushing a cart or a stroller, and anyone leaving a supermarket with a lot of groceries can appreciate the automatic doors.

Researchers in education have expanded the considerations of built-in adaptations and inclusive accommodations from architectural space to the educational experience, first in terms of designing physical and sensory means of access to the curriculum for children with disabilities (for instance, screen readers and preprogrammed "hot" or "sticky" keys); more recently this research has moved into considering cognitive disabilities and curriculum design. Two groups that have been instrumental in applying the concept of universal design to cognitive issues are CAST, the Center for Applied Special Technology, and the National Center to Improve the Tools of Educators (NCITE) at the University of Oregon.

HOMEPAGE

The TRACE Center at the University of Wisconsin is an interdisciplinary research, development and resource center on technology and disability. Dr. Greg Vanderheiden, who directs the TRACE Center, has been intensively involved in formulating universal design guidelines (relating primarily to sensorimotor access to products and environments). The TRACE Website is a good source of information about the overriding principles of universal design. The TRACE URL is:

http://www.trace.wisc.edu/

The CAST Homepage features extensive information and examples of universal design in education and also provides software (known as Bobby) that assesses the accessibility of a homepage, and suggests ways to improve it

http://www.cast.org

The NCITE Homepage can be found at:

http://darkwing.uoregon.edu/~ncite/

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A Definition of Universal Design for Learning

Using universally designed materials, teachers only need to teach one flexible curriculum in order to reach all their students.

In terms of learning, universal design means the design of instructional materials and activities that allows the learning goals to be achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember. Universal design for learning is achieved by means of flexible curricular materials and activities that provide alternatives for students with disparities in abilities and backgrounds. These alternatives should be built into the instructional design and operating systems of educational materials — they should not have to be added on later. As with architectural adaptations that are designed into a structure, universal design for learning is more efficient and economical—for instance, if a publisher produces a textbook that accommodates a broad range of cognitive and sensory abilities, that publisher can reach a wider market with a single product. Teachers can use the text without having to plan to adapt it for the special needs of their students. Using universally designed materials, both print and electronic, teachers only need to teach one flexible curriculum and become familiar with its variations in order to reach all their students.

What Universal Design is *Not*

It is important to reiterate that a curriculum has to present challenges in order for students to be motivated and progress educationally, regardless of the level of their abilities. The need to offer challenges in the curriculum is one the major ways that universal design for learning differs from universal design for other purposes (see Figure 1). For example, a universally designed keyboard needs to be as easy to use as possible, whereas a universally designed curriculum must challenge all students, even those at low ability levels.

Universal design does not mean that the instructional materials and activities accommodate students by lowering the standards. Universal design is not "dumbing down" the curriculum. It does not mean that the range of curriculum activity must be narrowed or that teachers find "the least common denominator" that appeals to the broadest number of students and teach the same thing in the same way to everyone. In fact, universal design is not ordinarily achieved by uniformity of any kind but rather by flexibility: universally designed instruction provides alternatives. It is helpful to remember that when we use the term universal design for learning, we are speaking of an instructional resource, a means for diversifying instruction to deliver the general education curriculum to every student, regardless of his or her abilities, and a means for diversify-

Figure 1. How Universal Design for Products and Environments Differs from Universal Design for Learning

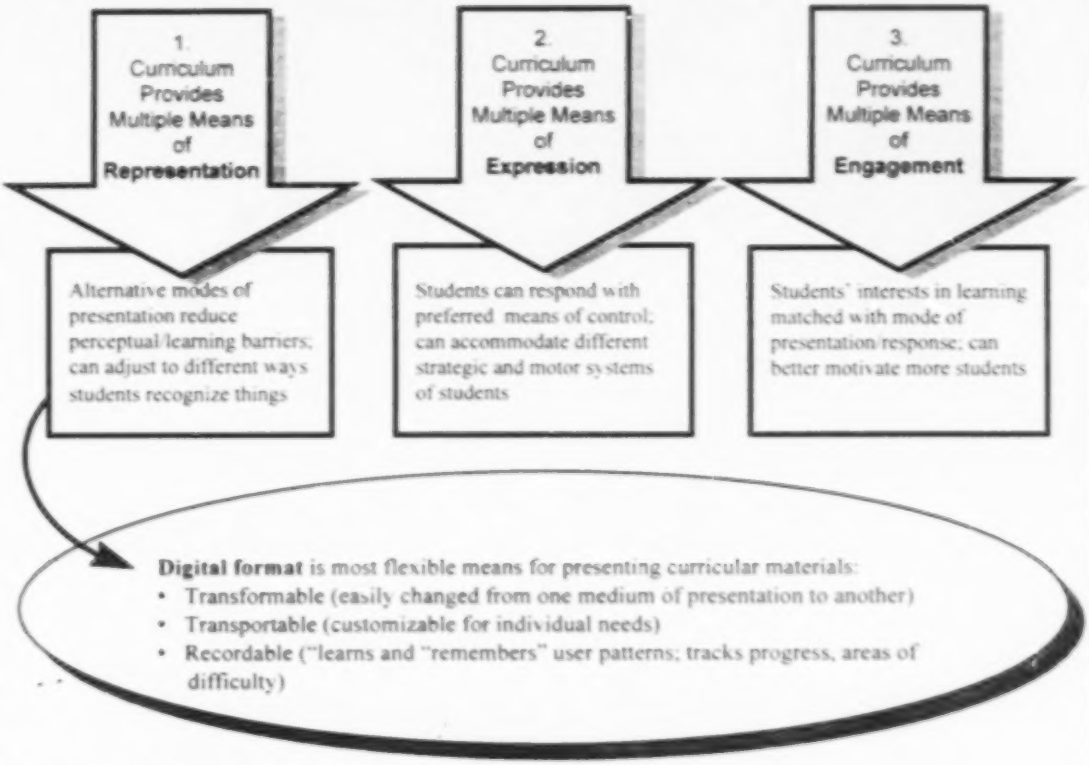
Design for Access to Product/Environment	Design for Access to Curriculum *(Universal Design for Learning)*
	Means of Access/Engagement
Product or environment must be usable by all people (to the greatest extent possible) without need for additional adaptation; e.g., curb cuts provide access to those in wheelchairs and all other pedestrians	Curriculum must be usable by all students (disabled and non-disabled) without need for additional adaptations ("add-ons") by teacher; e.g., electronic encyclopedia offers visual and auditory supports, differing levels of detailed information, cross-referencing
	Use
User controls all access, needs little or no help from others to use; design of product/environment enables self-sufficiency and independence	Student controls means of access but teacher monitors progress and may activate certain features; curriculum design enables student's self-sufficiency, but teacher remains active in teaching, facilitating, and assessing student's work
	Challenge
Minimized, if not eliminated Barriers to access are broken down as much as possible. The best designs provide the easiest and broadest access.	Some cognitive challenge must remain. Barriers to access are broken down, but right kinds and amounts of challenge must remain so that each student must push him- or herself — if access is too easy, no learning will take place.

ing the ways a student can respond to the curriculum.

Three of the essential qualities of universal design for learning are summarized in Figure 2.

Universal design is intended to be inclusive, not solely for students who have disabilities. A curriculum that incorporates universal design features should do more than accommodate physical, sensory, or cognitive disabilities; it should include students with differing abilities, cultural and linguistic backgrounds, and approaches to learning. If a particular teaching material or method excludes learners of any kind — disabled, diverse, non-disabled — then it works against the principles of universal design.

Figure 2. Three Essential Qualities of Universal Design for Learning


1. Curriculum Provides Multiple Means of Representation
2. Curriculum Provides Multiple Means of Expression
3. Curriculum Provides Multiple Means of Engagement
Alternative modes of presentation reduce perceptual/learning barriers; can adjust to different ways students recognize things
Students can respond with preferred means of control; can accommodate different strategic and motor systems of students
Students' interests in learning matched with mode of presentation/response; can better motivate more students
Digital format is most flexible means for presenting curricular materials:
• Transformable (easily changed from one medium of presentation to another)
• Transportable (customizable for individual needs)
• Recordable ("learns and "remembers" user patterns; tracks progress, areas of difficulty)

Source: Center for Applied Special Technology.
For the neurological foundations on which this diagram is based, and for examples of its application, see www.cast.org.

What Parts of the Curriculum Should Be Universally Designed?

Universal design applies not only to the content of a curriculum, but also to its goals, methods, and manner of assessment. Instructional content, the information and resources critical to the lesson, must also be accessible for learning to take place. Representing content only with printed text, for example, erects barriers to learning because the information in printed text is not accessible to many students (for example, those who are blind or dyslexic or who otherwise have difficulty reading the text). Universal design provides access by building-in multiple representations of that printed information — in text and voice, for example. But mere access is not in itself the solution to student engagement. For instance, video presentation can erect barriers unless alternative

representations, such as video description and captioning, are designed into the material.

To facilitate cognitive engagement with the curricular content, sensory accommodations in themselves are not always adequate. For example, middle school teachers will sometimes supplement a lesson with audio tapes for students who have difficulties comprehending the material encountered in their textbooks. Someone reads the text verbatim into a tape recorder and the teacher provides this tape to students who are reading below grade level. But though this process has been recommended as a way to provide student access, research has shown that without additional adaptations, the method by itself does not really help students improve their performance.[2] When the tape provides special instructions that help the students find and organize the information within the chapter, and when the students review the information to self-assess what they know, then their comprehension has been shown to increase considerably. A curriculum that provides both the speech capability and the organizational/cognitive supports for students could be said to utilize the principles of universal design.

Who Benefits from Universal Design?

No product will ever be totally universally applicable; no product will be able to do everything for every student, nor will anything ever replace or diminish the role of the teacher. Adaptations for individuals will continue to be made and every teacher will continue to need to know the best ways to meet the needs of his/her students. But currently, most adaptations are designed by the teacher as add-ons to standardized curricular materials, and teachers have little time to prepare individualized adaptations. By taking advantage of changes being made in new classroom materials and equipment, materials that "prepackage" adaptations and accommodations help teachers to assist a greater number of students gain access to the curriculum. Teachers no longer have to rely on "do it yourself" methods to reach these students.

2 Schumaker, J. B., Deshler, D. D., and Denton, P. H. (1984). "An Integrated System for Providing Content to Learning Disabled Adolescents Using an Audio-taped Format" in W. M. Cruickshank and J. M. Kliebhan (eds.), *Early Adolescence to Early Childhood. Volume 5. The Best of ACLD*, (79–107). Syracuse, NY: Syracuse University Press.

By using universal design principles, curriculum developers can create classroom tools that are successful for individuals who have disabilities, who have no identified disabilities, or who have extraordinary abilities. When developers consider the needs of the full range of possible users during the design phase, the resulting products are more useful for everyone.

Two Examples That Use Universal Design Principles

Universally designed materials need not be digital in nature, but two well-known examples of such design are digital. *WiggleWorks*, an early literacy program from Scholastic, builds in design features that allow children with many different abilities and disabilities to learn together. For example, all of the text can be enlarged, changed in color or highlighting, or read aloud by the computer. With *WiggleWorks* children can navigate the software's learning activities via mouse or keyboard, and children with significant motor disabilities can turn on a built-in scanning feature via a single switch.

In Microsoft's new *Encarta '98 for Windows*, video and audio are used to make many concepts clearer than text alone could do. Moreover, for children who are deaf, every video and audio is captioned using Microsoft's new SAMI technology.[3]

HOMEC

The National Center to Improve Practice through Technology, Media, and Materials (NCIP) features an academic discussion on the use of *WiggleWorks* as a classroom tool. The discussion can be found at:

http://www.edc.org/FSC/NCIP/EC_Insights_Wiggle.html

The *WiggleWorks* Homepage is at:

http://www.scholastic.com/wiggleworks/index.htm

Information on Microsoft's Encarta can be found at:

http://www.microsoft.com/encarta/

Suggested First Steps in Implementing Universal Design

At the November 1997 stakeholder meeting on universal design convened by the ERIC/OSEP Special Project, a group of researchers and developers reported on what they thought should be the most important next steps in implementing universal design for curriculum access. In part, their report stated: "Publishers should prepare and teachers should select instructional materials that are supportive and inclusive of students who have wide disparities in their abilities to see, hear, speak, read, etc. ...To achieve that end, we recommend that all developers of instructional materials adopt the concept of universal design and implement it in their products.

3 The ERIC/OSEP Special Project does not necessarily endorse these or other products that incorporate universal design features. These examples are provided merely for informational purposes.

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Furthermore, we recommend that teacher training programs prepare teachers for teaching in environments where the goals, methods, and materials are universally designed."[4]

If regular and special educators are collaborating on curriculum for their classes, preparing adaptations for special needs children, then they have already taken the first step to universal design.

Publishers respond to the needs of the market. When practitioners and local and state education agencies demonstrate their need for instructional materials that are supportive and inclusive of students who have wide disparities in their abilities to physically and cognitively access the curriculum, publishers will provide them. As researchers explore innovative ways to increase our understanding of curriculum access and more groups collaborate on ways to broaden the base of support for universal design, it will become a basic feature of the curriculum. But what can teachers do now?

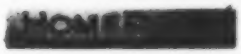
If a teacher is working within an inclusive environment, teaching children with and without disabilities, chances are he or she is probably already on the path to understanding and implementing universal design principles. Planning for an inclusive classroom is not a new concept. If regular and special educators are collaborating on curriculum for their classes, preparing adaptations for special needs children, then they have already taken the first step to universal design. Materials that have had planning built into them will save teachers that step and allow them to start teaching with the materials.

As teachers and publishers consider implementing universal design principles in classrooms, the following summary of five first steps (which are currently achievable in many classrooms) can provide a solid foundation for future developments in universal design for learning. (The first four steps fall within the guidelines for accessible design from the Telecommunications Act of 1996. The last step extends the scope to include cognitive access):

1. Provide all text in digital format.
2. Provide captions for all audio.
3. Provide educationally relevant descriptions for images and graphical layouts.
4. Provide captions and educationally relevant descriptions for video.

4 From the Developers Group Report. David Rose, unpublished.

5. Provide cognitive supports for content and activities:
   - Summarize big ideas
   - Provide scaffolding for learning and generalization
   - Build fluency through practice
   - Provide assessments for background knowledge
   - Include explicit strategies to make clear the goals and methods of instruction[5]



The complete text of the guidelines set up by the Telecommunications Act of 1996 can be found as an appendix to the Department of Education's Computer Accessibility Technology Packet, which Secretary Riley sent last October to state and local education agencies. The URL for the "Tech. Pack" is:

http://www.ed.gov/offices/OSERS/techpack.html

This way of thinking about the interrelationship of access, instruction, and technology in an inclusive classroom reflects a public statement of Education Secretary Richard Riley in his November 1997 *Computer Accessibility Technology Packet* or "Tech Pack," which was intended to help schools make decisions about technology purchases. The Secretary wrote: "As the developers of computer hardware and software recognize the benefit that can be derived from all individuals (those with and without disabilities) being able to use the same computer equipment and software applications, the concept of universal design in the development of new products becomes more accepted and built-in access should become more readily available."

Organizations such as NCITE, CAST, and TRACE are devoting their resources to making sure that the principles of built-in access will be more readily available as American education is propelled into the 21st century. CEC and other associations are working to make sure that teachers are prepared to use all the tools at their disposal and that as curriculum publishers develop new, technologically based products, they will be able to incorporate the latest findings of educational researchers and meet the needs of schools across the country.

5 For a detailed discussion of the features of instructional tools, see Kameenui and Carnine, *Effective Teaching Strategies that Accommodate Diverse Learners*, especially pp. 7–12.

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Appendix: A Framework for Universal Design in Curriculum Development

Note: This framework summarizes the salient principles of universal design in a practical context, and is included here to help teachers and other interested individuals consider how the tools employed in the classroom can realistically provide broader access to the curriculum for all students.[6]

1. Provide Flexible Means of Representation

There is no single method for the presentation of information that will provide equal access for all learners. Any representational method that facilitates learning for some students presents barriers for others.

Look for flexible alternatives such as the following:

A. Alternatives that Reduce Perceptual Barriers

Text. Printed text is "fixed" (not flexible) and creates barriers for many students (e.g., those with learning disabilities, low vision, or blindness). Digital text (on a computer) is flexible: it can easily be transformed in size, shape, or color, and can be automatically transformed into spoken speech.

Audio. When key information is presented solely in audio form, it creates barriers for students who are deaf, who are non-native speakers of the language, who have auditory processing problems, and even for those who are merely in a noisy environment. Audio with captions provides flexible alternatives for all of these.

Image/Graphic. When key information is presented solely in graphic or pictorial form, it limits access for students who are blind or have low vision. Digital images with verbal description provide access for those individuals and also provide flexibility for instructional emphasis, clarity, and direction.

6 The ideas that are presented in this framework reflect discussions among CEC and other groups prior to and at the November stakeholders' meeting on universal design. We are indebted to CAST for the general framework and to David Rose for developing this version.

B. Alternatives that Reduce Cognitive Barriers

Big Ideas. Key concepts are sometimes inaccessible because of the linguistic or conceptual complexity of the surrounding content. Providing summaries of "Big Ideas" improves access for some students and provides needed emphasis for many.

Background Knowledge. Some students face barriers because they lack necessary background knowledge about the specific topic. Pretesting for required background knowledge prior to an activity can alert a teacher to the need for more preparation. Digital materials can include optional supports for background knowledge, to be used by those students who need them.

2. Provide Flexible Means of Expression

There is no single method of expression that will provide equal opportunity for all students. Because of individual differences among students, any single form of communication or operation will facilitate expression for some students and impede it for others. Look for flexible alternatives for expression, such as the following:

A. Alternatives that Reduce Motor Barriers to Expression

Writing. Pencil and paper exercises present barriers to many students who have difficulty physically forming letters, writing legibly, or spelling words. The same exercises provided in digital form on the computer can provide supports and alternatives enabling more students to succeed. Examples include on-screen scanning keyboards, enlarged keyboards, word prediction, and spellcheckers.

Speaking. Speeches and oral presentations provide a welcome alternative to writing for many students, but present barriers for others. The option to create multimedia presentations provides access to those for whom speech is not a viable presentation method. This option provides support and clarity for students with varied styles as well.

Drawing/Illustrating. Graphic design and illustration as means of expression are difficult or impossible for some students. Digital graphic programs and libraries provide needed support for many who cannot draw by hand and helpful scaffolds for all.

B. Alternatives that Reduce Cognitive Barriers to Expression

Explicit (or Conspicuous) Strategies. Any formal means of expression requires a series of steps to prepare and execute. In order to succeed, some children need those steps explicitly stated and taught, not leaving any part of the process to intuition.

Scaffolding. Scaffolding is a temporary support for learning that is gradually reduced as the student develops confidence with the new content or skills. For example, a teacher may allow a bilingual student to give an oral book report in his native language, translating the information for him and asking questions in English until the student's expression in English matches his understanding.

3. Provide Flexible Means of Engagement

There is no single way to ensure that all children are engaged in a learning environment. Individual differences in emotional constitution, background, culture, developmental experience, or neurological characteristics can result in very different patterns of motivation and affect for different children. To engage the majority of children, a curriculum should provide flexible alternatives for each of the following along a continuum:

Support and Challenge. For all children, an appropriate balance of support and challenge results in optimal engagement—but for each child the point of such balance is different. Providing flexible options for setting the level of challenge and building in supportive scaffolds allows more children, and their teachers, to find the right balance.

Novelty and Familiarity. Almost all children are attracted to novelty but there are considerable individual differences in the degree of novelty/familiarity that appeals. Providing flexible options for the amount of repetition, familiarity, randomness, surprise, and so forth, allows more children to stay engaged.

Developmental and Cultural Interest. Children at different ages, and children from different cultural backgrounds are attracted to different content and formats. Providing key concepts in multiple formats and contents provides alternatives that are likely to engage a broader set of children.

Flexible Curricular Materials. For any child, and for his or her teachers, the opportunity to contribute to the curriculum by adding their own images, sounds, words and texts to what has already been developed, often leads to a deeper engagement than in a curriculum that is delivered completely fixed. This type of curriculum is sometimes referred to as being "half full." The term is not meant to imply that the curriculum is unfinished or unplanned, just that it is flexibly structured to allow for direct input from students with differing abilities and thus to reach them in more effective ways.

For Further Information

Note: URLs for these locations appear in the margins throughout this topical brief.

IDEA Amendments

For comments or questions about IDEA or for more information on the Computer Accessibility Technology Packet, contact the Department of Education, Office of Special Education and Rehabilitative Services (OSERS):

U.S. Department of Education
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Washington, DC 20202
Phone: 1-800-USA-LEARN
Fax: 202-401-0689
TTY: 1-800-437-0833
E-Mail: CustomerService@inet.ed.gov

CEC publishes a reference book on compliance with the IDEA reauthorization legislation, titled *IDEA 1997: Let's Make It Work*. The book is available through CEC's publications program, the URL for which is: http://www.cec.sped.org/bk/catalog/law.htm#1

To order by telephone, call: 1-888-CEC-SPED; to e-mail any questions: cecpubs@cec.sped.org

Resources on Universal Design

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